

REGISTRATION: Tuition, including all course materials and luncheons, is \$195 for the first student and \$175 for each additional student from the same organization. A maximum of forty registrations will be accepted. Hotel rooms are not included.

THE INSTRUCTOR: Walter E. Simonson is manager of operations research at the C-E-I-R center in Washington, D. C. In that capacity his assignments range from design of the real time communication net and display system for network television coverage of a presidential election, to design of an on-line ordering and inventory system for a major paper manufacturer. His background includes work in systems analysis, computer design, information retrieval, network scheduling, and other fields including social and behavioral science models. He has technical responsibility for C-E-I-R time sharing development and telecommunication. Before joining C-E-I-R Simonson had software support responsibilities for a major computer maker, served as vice president of a research firm in Canada, and was associate professor of communication at the University of Southern Mississippi. He has a doctorate (communication) from the University of Minnesota, and bachelor's and master's degrees from the same university.

HOTEL ACCOMMODATIONS: The seminar is at the Executive House, 1515 Rhode Island Ave., N.W., Washington, D. C. The hotel is holding a block of rooms for seminar participants at \$14 (single rate) until two weeks before the seminar. Free parking is offered guests. The hotel phone is (202) ADams 2-7000.

OTHER COURSES: Among those currently scheduled is:

DOCUMENTATION & DEBUGGING: A four day seminar for programmers and programmer managers. Reviews current practice and suggests standards for effective operations. Tuition is \$220. Statler-Hilton Hotel, Washington, D. C., June 14, 15, 16, 17.

For an outline of this seminar, or a catalog of current courses, write:

**Registrar
Institute for Advanced Technology**

C-E-I-R^{INC}

**1200 Jefferson Davis Highway
Arlington, Virginia 22202**

SURVEY OF DATA COMMUNICATION

**A three-day seminar
Executive House Hotel
Washington, D. C.
June 21, 22, 23**

Intended for the data processing man who is preparing for an on line, real time or other system which involves data communications. The seminar is designed as an orientation to the hardware and software considerations important to successful systems design, and to data communications concepts and terminology. Major subjects include: Common Carriers and the Federal Communications Commission; Communication Media; Types of Service; Terminal Devices; Data Codes; Error Detection and Correction; Terminal-Oriented Software, and Computing Hardware Features to Look For. Tuition, including luncheons and course materials, is \$195 for one student and \$175 for additional students from the same organization.

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1200 Jefferson Davis Highway
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Phone (703) 684-6377 Ext. 494**

DATA COMMUNICATION

INTRODUCTION

Why is there so much interest in data communicating, on-line system, real time application? How do these relate to the mainstream of computation? What is the future of these applications?

Development of Data Communication

Role of Data Communication in modern computation

THE COMMON CARRIERS AND THE FCC

Who provides communication service? How do you deal with these firms? How do the services differ? How are these firms regulated? How do they regulate?

A. T. & T.

Western Union

Regional and local carriers

The FCC

The State Commissions

COMMUNICATION MEDIA

How is data transmitted? What are the implications of the difficult methods? How do they affect the computer user?

Bandwidth and channel capacity

Cable

Microwave

Cosmat and other

TYPES OF SERVICE

What are the services offered by the common carriers? What are the characteristics of the different grades of service? For whom are they intended? What are the economics of different types of service?

Teletype grade

Voice grade

"Conditioned" lines

Broadband transmission-telepak

Private lines

Switched Networks

WATS & WADS

Half and Full Duplex

TERMINAL DEVICES

What are the types of terminals on the market? What should the user look for in terminal equipment? How do terminals affect the economics of data communication? What are the key features of such devices as the IBM 1050, 1978, etc., Honeywell data set, Teletypewriters such as the Model 33, 35, ACS or Dataspell, etc.

Synchronous vs. non synchronous transmission

Typewriter type devices

a. Teletype

b. Remote typewriters

Paper tape

Punched card

Remote line printers

Magnetic tape

Display stations

Multifunction stations

Remote satellites

Multiplexors

DATA CODES

How is data encoded for transmission? What factors should affect selection of the codes to be used?

Baudot

ASC II

4 of 8

Field data

Other

ERROR DETECTION AND CORRECTION

How are transmission errors caught? How can one correct errors when they occur? What should the systems designer look for?

Hardware approaches

Programatic approaches

TERMINAL ORIENTED SOFTWARE

What should one expect in manufacturing software to handle data communication chores? How suitable are the major compiler languages for data communication applications?

Criteria

Cobol, PL/I, Fortran

Manufacturer packages

COMPUTING HARDWARE FEATURES TO LOOK FOR

What should one look for in a computer to handle data communication? What makes a good communication processor?

Input-output logic

Central Processor functions

IMPLEMENTATION CONSIDERATIONS

How do real time systems differ from conventional applications?

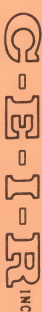
Programming

Systems Design

Cost Analysis

A LOOK TO THE FUTURE

Where are we going? What factors will determine the shape of future developments?



C-E-I-R INC is an international applied research and data processing corporation that offers analytical, scientific and computer services to business, science and government. Founded in 1954, it is today the world's largest, most experienced and best equipped independent organization in its field. The C-E-I-R professional staff includes several hundred mathematicians, statisticians, economists, operations researchers, management scientists and others from a variety of disciplines. In addition, many of the finest scientific and professional men in America are retained on a consultant basis. Augmenting this professional capability are modern electronic computing equipment, and skilled computer programmers and operations personnel at computing centers in five major U.S. cities, London, The Hague and Mexico City.



is the latest expression of C-E-I-R's

long-standing involvement in management education. The revolutionary nature of computer-based methods made education an integral part of C-E-I-R operations from the beginning. This relationship is formalized through the Institute for Advanced Technology. IAT faculty members are drawn primarily from the ranks of C-E-I-R's professional and computer operations staffs. Its curriculum is drawn from subjects in which C-E-I-R staff members are expert—recognized for excellence in day-to-day application of the art and science of computer usage to the real problems of C-E-I-R customers in business and industry. Sharing these new skills through seminars in major cities, management clinics, and special, in-plant training programs is the major goal of the Institute for Advanced Technology.

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1200 Jefferson Davis Highway
Arlington, Virginia**

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SURVEY OF DATA COMMUNICATIONS

A three-day Seminar

Intended for the data processing man who is preparing for an on line, real time or other system which involves data communications. The seminar is designed as an orientation to the hardware and software considerations important to successful systems design, and to data communications concepts and terminology. Major subjects include: Common Carriers and the Federal Communications Commission; Communication Media; Types of Service; Terminal Devices; Data Codes; Error Detection and Correction; Terminal-Oriented Software, and Computing Hardware Features to Look For. Tuition, including luncheons and course materials, is \$195 for one student and \$175 for additional students from the same organization.

**Executive House Hotel
Washington, D. C.
June 21, 22, 23**

Register me for: SURVEY OF DATA COMMUNICATIONS ☐

NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

PHONE: _____

Please Register This Additional Student:

NAME: _____

TITLE: _____

CHECK ENCLOSED ☐

BILL My Company ☐

YOU NEED TO KNOW

DATA COMMUNICATIONS

Dear Sir:

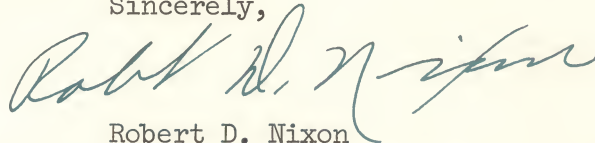
Whether you are involved now in decisions about data communications, or simply realize your need to bone up on this rapidly growing aspect of the data processing business, the "Survey of Data Communications" seminar is important to you.

This seminar is designed to equip you to recognize and deal with the hardware and software problems whose solutions are important to successful on-line and real time systems design. Careful attention is given to the concepts and the terminology of this complex and fascinating field. Though the seminar will not turn you into a communications engineer, it will enable you to talk to one knowledgeably.

C-E-I-R has solid experience in solving the practical problems of making on-line and real time systems work, and work economically. Walt Simonson, the instructor for this seminar, has played a leading part in much of this work, and is prepared to share this hard-won knowledge with you.

Please read the enclosed course outline carefully. There, more effectively stated than anything we can say here, are the reasons why you should mail your registration form today to reserve a place at the June 21-23 presentation at the Executive House Hotel in Washington, D. C.

Sincerely,



Robert D. Nixon
Director of Curriculum